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MONEYLENDERS AND BANKERS: FRAGMENTED CREDIT MARKETS WITH MONOPOLISTIC COMPETITION

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Abstract

This paper proposes a model of a rural credit market that is motivated by micro-studies in Asian developing countries. The screening and enforcement technology is very limited: banks lend only to large landowners, and moneylenders can screen small farmers and enforce repayment from them only by interlinking trading arrangements with credit. In the environment assumed in the model, an expansion of bank credit may fail to reduce the interest rates that moneylenders charge and may even increase them, whereas general improvements in technology do tend to reduce the interest rates that moneylenders charge.

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Moneylenders and Bankers: Fragmented Credit Markets with Monopolistic Competition

"...[it is a] nearly universal fact that the poorest strata of the peasantry in many underdeveloped countries rely heavily, if not exclusively, on private moneylenders and not on sources of institutional finance. Indeed, financial institutions like banks and credit cooperatives typically do not consider them creditworthy, but paradoxically enough, private moneylenders do consider them creditworthy for advancing loans." (Amit Bhaduri, "Moneylenders," in The New Palgrave, 1987)

Many markets are fragmented, with different prices prevailing in different settings for the same goods, services, or factors. One well-known cause of market fragmentation are government controls that create excess demand (or supply) in official markets that spills over into uncontrolled or illegal markets where it is satisfied at a higher (lower) price. But even if government did not intervene, some markets would still be fragmented because of information and commitment problems and transaction costs differentials facing buyers or sellers.

Generally, fragmentation entails resource misallocation. But designing interventions that reduce these problems requires knowing the underlying source of the fragmentation and the way in which the different segments of the market interact.

Fragmented capital markets are a hallmark of a developing country and may be an important cause of low levels of economic development, as emphasized by McKinnon (1973) and Townsend (1983). Typically the credit market of a developing country consists of a *formal sector*, where institutional lenders provide intermediation between depositors (or the government) and borrowers, and an *informal sector*, where individuals lend primarily out of their own equity. In most developing countries, over half the total value of loans to agricultural households are from informal lenders (see Table 1 below and Germidis, 1990, Table 1). Informal lenders, other than kith and kin, generally charge very high interest rates--much higher than those in the formal sector[1]--and operate side by

[1]At the same time, the default rate is generally *lower* on informal loans; see Siamwalla et al. (1990), Bell (1990), and Aleem (1990). In the 1980s in Thailand, for example, larger and wealthier

side with formal financial intermediaries that generally have cheaper sources of funds and more diversified portfolios. Problems of identifying the repayment abilities of borrowers and enforcing repayment lead banks and other formal lenders to concentrate on loans with strict collateral requirements--requirements that exclude asset-poor borrowers from the formal sector. In contrast, informal lending is embedded in a social or economic context that facilitates the screening of borrowers and the enforcement of debt contracts. A lender with strong social ties to a borrower can rely on his personal knowledge of the borrower and has recourse to social sanctions (see, e.g., Udry 1990). A lender who also serves as a trader or employer for a borrower can collect outstanding debt from his marketed surplus or his wages. Less benignly, an informal lender may be able to prevent wilful default by the threat of violence.

This paper directly addresses two questions: In a rural credit market that is fragmented between a formal and an informal sector, will an expansion of formal credit expand borrowing opportunities to the asset-poor borrowers who continue to rely on informal credit? That is, is there *trickledown*? And what are the effects of technological progress on informal sector interest rates? Our answers will shed light on a third, more fundamental question posed by Goldsmith (1969), McKinnon (1973), and Townsend (1983): Are fragmented credit markets a cause of low levels of economic development, or a consequence of low levels of economic development that will be resolved when production opportunities improve?

These questions are of intense practical importance because many developing countries have adopted a supply-leading approach to finance. They have created rural credit agencies and rediscounted agricultural loans at favorable rates, allegedly as a way of enhancing credit to small farmers. But lending by state credit agencies, which may face information and enforcement problems

farmers generally had access to some funds at 12-14 percent, while in the informal market, the mean annual interest rate for each of four provinces surveyed by Feder et al. (1988, Table 10) was roughly 50 percent. Most of these loans were for 12 months or less; the usual term in the informal sector was one cropping season (about six months).

as great as those of private banks, has been heavily biased toward large farmers.[2] Although it is difficult to gather reliable data on interest rates in the informal sector, there is little evidence that as rural formal credit has expanded, the hoped-for reduction in the interest rates charged by rural moneylenders has occurred. In Thailand, for instance, Siamwalla et al. (1990, p. 285) and Onchan (1992, p. 108), among others, have reported that the interest rates that moneylenders charge have been *stable*, despite a massive and well-documented expansion of formal credit in rural areas.

This result is puzzling. Existing models of credit markets, whether they entail competitive market-clearing, rationing, or monopoly, predict that when the supply of credit is increased through provision of loans to *any* set of agents, there will be some trickledown effect to other borrowers.[3] Creation of new sources of credit should increase the competitiveness of the credit market; and because those who obtain the credit from the new source would normally borrow less from their initial suppliers of credit, the reduction in demand would tend to drive interest rates down. Thus, according to the standard models, even if the *direct* beneficiaries of government credit programs are large landowners, the eventual beneficiaries should include small farmers.

Resolving the Quandary

The model we propose provides a way to resolve the quandary. The model is motivated by the findings of recent case studies of the micro-structure of rural credit markets in Asian developing

[2]For instance, Lipton and Toye (1989, Ch. 5) examined World Bank projects involving rural credit in India and found that the majority excluded farmers with less than 2.5 or sometimes 5 acres, or tenants, or both. By this means, several major World Bank-assisted credit projects completed in the 1980s excluded more than half of all farm households, although the credit was supposed to be for smallholders. Similar results are reported for a variety of credit programs in LDCs in Iqbal, 1988, Table 1; Floro and Yotopoulos, 1989, Table 3.5; and Siamwalla et al., 1990, Table 3.

[3]The only exception is the case of perfectly discriminating monopoly.

countries where traders constitute the single most important source of informal finance. Traders have an enhanced ability to screen and monitor borrowers and enforce repayment. In the model, the enhanced screening, monitoring, and enforcement abilities provide a return to becoming a trader that induces entry into that activity by those who have funds. An expansion of lending from the formal sector, with the funds going to large landowners because they have collateral that is valuable to (and easily measured by) formal institutions, induces further entry by large landowners into the moneylending-trading sector. For reasons discussed later, the new entry may lead to higher marginal costs of lending in the informal sector. Moreover, because funds from the subsidized formal sector are, in general, rationed, the subsidy to moneylenders is inframarginal so there is no direct pass-through of the lower borrowing rate to the informal sector. We show that rather than being passed on to the small farmer, the credit subsidy will be partly absorbed in the reduced efficiency of the moneylending-trading sector. Indeed, it is even possible that an expansion of formal credit to large landowners *increases* the equilibrium interest rate charged by moneylender-traders.

Our results may be summarized as follows:

1. The benefits of an expansion of formal credit may fail to trickle down to the small farmer who relies for credit on moneylender-traders.
2. Those forms of technological change that can be represented solely by a shift out in the demand for credit may also fail to benefit the small farmer.
3. A marginal reduction in screening, monitoring, and enforcement costs, such as would generally accompany yield-increasing technological change or improvements in farmers' access to markets, does increase the supply of credit (lowering interest rates). The reason is that the small farmer's collateral is in the form of the standing crops of his future labor service. Changes in technology that increase the average value of his yields and thereby increase his permanent income, or that reduce the prospective lender's costs of evaluating that income, will reduce the marginal

screening, monitoring, and enforcement costs of lending an extra dollar, which encourages more lending. Thus we can explain the empirical observation that improvements in technology have been accompanied by both an increase in borrowings and a reduction in interest rates.

A Closer Look at Rural Credit Markets

The theory we propose, in which there are marked differences among lenders in their ability to screen, monitor, and enforce repayment from particular borrowers, can be looked at as a very simple *matching theory*, where prospective borrowers are matched with lenders according to the ability of a given lender to differentiate among borrowers and enforce repayment by a given borrower. In our model, only a large landowner can be matched with a formal lender (a "bank"). Only an individual who markets his surplus through a trader can be matched with that lender-trader. The lender-trader, unlike the bank, can lend to the small farmer without fixed collateral because he obtains virtually complete knowledge of his productivity through a long-term, exclusive marketing relationship with the farmer-borrower, and he can collect directly from his fields at the time of harvest.[4]

Table 1 illustrates the dominant role that traders play in informal lending to farm households in various parts of Asia where marketable surpluses are large. In lines 2 and 3, *developed areas* refer to high-productivity and more commercialized villages in the Philippines, and *marginal areas* refer to the low-productivity and less commercialized villages. The distinction between developed and marginal areas is also reflected in lines 4 and 5, but at a state rather than village level, since agriculture in the Indian state of Punjab is much more commercialized than in Andra Pradesh. Trade-linked credit is the

[4]In a more complete model, we would match rural laborers with their employers, for whom loans are just a wage advance. We would match tenant farmers with landlords, where default is punishable by eviction from the land (see Floro and Yotopoulos, 1991, pp. 61-64 for the Philippines). And we would match friends and relatives with one another.

most important source of credit received by cultivating households in commercialized areas (lines 2 and 4), but not in the poorer areas where farmers produce largely for subsistence (lines 3 and 5), and obtain most of their credit from landlords, relatives, and friends. Since most trader-provided credit is interlinked with agricultural marketing, trader-provided credit is a more important source of credit for cultivating households than for all rural households; thus, the 32 percent figure for Thailand (line 6) understates the percentage of credit received by cultivating households from lender-traders. The same Thai survey showed that trader-provided credit represented a much larger share (72%) of total credit provided by lenders not resident in the borrower's village. This is as intuition would suggest, since nonresident lenders' opportunities to screen, monitor, and enforce through means other than trade interlinkage are more limited than those of resident lenders, who may come into contact with their clients daily.

Relationship with Other Models of Financial Markets

Figure 1 attempts to illustrate the relationship of our model to other models of financial markets. The central problems of lending are the selection of borrowers and projects, the reduction of the moral hazard problems associated with borrowing, and the enforcement of repayment terms. The literature on *indirect screening* and *signalling* mechanisms is concerned with markets where there is private information held by borrowers regarding their "type" or the choice of project to be undertaken. The lender's problem is to choose contractual provisions (interest rates, collateral, terminations) to screen out the riskiest borrowers and the riskiest projects (see, e.g., Stiglitz and Weiss, 1981, 1983). And the borrower's choice of financial contract, or the firm's choice of a financial structure, may signal information to lenders (Ross, 1977).

But in rural credit markets in developing countries, many lenders acquire virtually complete information about the creditworthiness of borrowers and thus do not rely on indirect screening mechanisms, as field studies have emphasized (see Siamwalla et al. 1990, pp. 288-90; Bell 1990, pp. 312, 323; and Udry 1990). Moreover, while the indirect screening literature usually assumes that

lenders are homogeneous, a salient aspect of rural credit markets in poor countries is that prospective lenders do not have access to the same direct screening mechanisms (Hoff and Stiglitz, 1990, pp. 240-45). Thus, while the literature on indirect screening emphasizes information asymmetries *between* borrower and lender, the theory presented here on direct screening mechanisms emphasizes asymmetries *across* lenders. The difference in their ability to screen, monitor, and enforce gives rise to asymmetries *ex ante*, before a prospective borrower has established any credit relationship. The fact that information is not easily transferable gives rise to asymmetries across lenders *ex post*. As we will try to show in Section V (see also Aleem, 1990), the direct screening process undertaken by a lender-trader entails making an investment to gain inside knowledge about a borrower. The resulting relationship-specific capital between the borrower and lender insulates the lender's market from competitors even when his charges exceed the marginal cost of lending. This relationship-specific capital is further enhanced by the fact that the borrower has imperfect information about his opportunities to borrow (both availability and terms) from other lenders. Thus in our direct screening model, the market for trader-provided credit is neither perfectly competitive nor perfectly monopolistic but monopolistically competitive.[5]

Most models of screening and signalling just *assume* that if a borrower can repay a loan, he will. In practice, getting repayment is not so easy. There are two separate problems--ascertaining whether the borrower can in fact repay and, if he can, forcing him to do so. The first problem is studied in *costly state verification (CSV)* models (Townsend, 1979; Douglas Diamond, 1984). In contrast, this paper

[5]Our analysis provides an alternative to the theory of the interlinking of credit contracts in Braverman and Stiglitz (1981). That theory focuses on the use of interlinkage as a means of coping with asymmetric information and mitigating moral hazard, and is consistent with either monopoly or perfect competition. But here we view interlinkage as providing a means of direct screening which, once undertaken, acts as a barrier to entry by third parties and is thus a source of monopoly power, as emphasized in Bardhan (1989, p. 240).

focuses on the creditor's compliance problem. It is unreasonable to model markets in developing countries as if all the institutions necessary to enforce contracts had already emerged. In many developing economies, resort to formal law enforcement may provide a doubtful remedy for wilful default.[6] In this respect lending within developing countries raises problems similar to those raised by lending from foreign banks to sovereign governments, since the sovereign government's assets are largely beyond the reach of the lender's legal system. But unlike the case of sovereign debt, informal rural credit markets are embedded in a social and economic context that provides substitutes for court enforcement of debt. In particular, a trader who markets a farmer's crop is in a good position to ensure repayment of debt.

To summarize, our model fits into the schema of Figure 1 in two ways. The model is the first attempt at a general equilibrium model based on *interlinked enforcement*. It is also a *direct screening* model where the central problem arises from asymmetries across lenders *ex ante* in their ability to screen, and *ex post* after screening is undertaken. Banks' very limited ability to screen means that they operate almost like pawnbrokers, lending only to those who have fixed assets. On the other hand, moneylenders who interlink credit with trade can screen asset-poor borrowers; but they do not have the ability to intermediate funds across the public, so that their opportunity cost of funds is high, and the screening process gives them market power and thus precludes competitive pricing.

Section I of this paper presents the model. Sections II and III show, first heuristically and then formally, that an expansion of formal credit has an ambiguous effect on informal sector interest rates. The initial fall in interest rates may be offset as new entry occurs. Section IV considers the effects of technological change on informal sector interest rates. In Section V, we justify many of the assumptions

[6]Even in developed countries, the cost of enforcement may not be insignificant; and the lender still must worry about the possibility of bankruptcy. Hence, much of what we have to say here has relevance to large segments of credit markets in developed countries, as well.

of the model by describing the *modus operandi* of lender-traders in some Asian developing countries. Section VI is a brief summary.

I. The Model

We assume that

(A.1) Credible promises of debt repayment can be made only between (a) banks and large landowners and (b) lender-traders and their clients.

(A.2) The only competition in the informal credit sector is entry competition, not price competition.[7]

The rural economy consists of small landowners and large landowners. The latter are also endowed with liquid capital, K. There is a single agricultural output good, and all landowners trade part of their output good for an importable consumption good. The price ratio is set at one in world markets. Given (A.1), large landowners can lend to small landowners only if the loan is interlinked with trade in output. Thus, large landowners who lend to small landowners are *lender-traders*. The flows of credit between agents are illustrated in Figure 2, where G is the formal sector credit ration available to a large landowner. The first question that we wish to examine is the effect on the interest rate charged by lender-traders of an expansion of subsidized formal credit, G.

A. Demand

The amount that each small landowner borrows is a function of the interest rate charged,

$$z = z(i), \quad \text{with } z' < 0. \tag{1}$$

At higher interest rates, small landowners borrow less.[8]

[7]These assumptions are stronger than needed to obtain our results; see parts III.C.2 and III.C.4.

[8]We do not explicitly model the production or financial opportunities available to the small landowner. The function z(i) reflects the reduced-form solution to an optimization program where the small landowner may save and may undertake a variety of activities, both on and off the farm. The

Each lender-trader insists on an exclusive lending relationship in a given season, and has the information to enforce such an exclusivity rule. In a symmetric equilibrium with Z borrowers and N lender-traders, the total amount lent by any lender-trader is L, where

$$L = z(i)\frac{Z}{N} \tag{2}$$

Equation (2) defines the inverse demand function facing the lender-trader in a symmetric equilibrium:

$$i = i(LN), \quad \text{with } i' < 0. \tag{3}$$

Its elasticity is, in absolute value,

$$-\frac{\partial \ln i}{\partial \ln(LN)} = -\frac{\partial \ln i}{\partial \ln L} = -\frac{\partial \ln i}{\partial \ln N} = -\left[\frac{d\ln z(i)}{d\ln i}\right]^{-1} \equiv \eta \tag{4}$$

The proportional price response to an increase in supply is the same whether the increased supply comes from higher lending by the lender-trader, for given N, or from new entry, for given L. This property reflects assumption (A.2) that lender-traders compete only through entry, not through price.

B. The lender-trader's costs of lending

A lender-trader's costs consist of three components: a fixed cost δ per period for a warehouse, the cost of funds lent out, and a non-pecuniary cost of effort to screen and monitor borrowers and enforce repayment. For simplicity, we assume that the trading activity entails only the fixed cost δ, and no marginal costs.

An implication of this last assumption and the assumption that traders engage in price competition is that they will charge nothing for the services of storage/trading. To see this, observe that large landowners who are not themselves traders are indifferent between the services of any two traders who charge the same price. A Bertrand Nash equilibrium will entail a zero charge for trading

nature of his opportunities will affect the elasticity of z(i).

services since marginal costs are zero.[9] This, in turn, implies that all traders will be moneylenders, since only in that way can they cover their fixed costs of trading. (We already know that all moneylenders will be traders, since only in that way can they ensure repayment.)

We simplify the analysis by assuming that there are only two types of small farmers: those who, with sufficient attention to repayment, will always repay their loans, and those who, with any reasonable level of effort expended by the lender on enforcement, would not repay their loans (e.g., simply because their output is too small). We assume that, with adequate screening activities, a lender-trader can sort out good from bad risks, and that it always pays lender-traders to incur not only those costs, but also the costs required to have debt contracts enforced.[10] Thus, in this simplified model, the probability of repayment is one. There are Z (good) borrowers.

The screening, monitoring, and enforcement costs depend on the amount lent (L) and the number of other lender-traders (N):[11]

$$C = C(L,N) \quad \text{with } C_L > 0 \text{ and } C_{LL} > 0. \tag{5}$$

With fixed market size and fixed N, an increase in L entails bigger loans to each borrower. A

[9]In a more general model in which we explicitly modelled transportation costs involved in trading, the market for trading services as well as for informal credit would be monopolistically competitive. The qualitative nature of our results does not depend sensitively on this simplification.

[10]In other words, so long as the probability of repayment is less than one, the marginal return to an increase in screening, monitoring, and enforcement activities exceeds the marginal costs.

[11]This function was used in Siamwalla et al. (1993). It is reasonable also to suppose that screening, monitoring, and enforcement costs increase with the interest rate charged, as in Eaton and Gersovitz, 1981. Thus, we obtain C = C(N,L,i), with $C_i > 0$. Nothing in the later analysis is affected by this generalization.

borrower's proclivity to engage in risky activities and his gain from not repaying a loan both increase with the amount due (see Stiglitz and Weiss, 1981, and Eaton and Gersovitz, 1981); hence, marginal costs of lending an extra dollar are positive and increasing. We do not need to fix the sign of C_N, but we will use a stability argument in (12) to place bounds on its magnitude.

An expression that will be crucial in the analysis below is the effect of a perturbation in N on the marginal costs of lending *at a given interest rate*, in the symmetric equilibrium where each lender lends L. The direct effect is $C_{LN}dN$. But for a given interest rate and, hence, a given aggregate lending LN, an increase in N implies a decrease in L, $\frac{dL}{dN} = -\frac{L}{N}$. The indirect effect of an increase in N is thus a reduction in marginal lending costs by $C_{LL}\frac{L}{N}dN$. Summing the two effects, an increase in N, for given i, will increase marginal lending costs if $NC_{LN} - LC_{LL} > 0$.

To develop some intuition about this expression, we need to put more structure on C(L,N). A reasonable assumption is that the lender-trader's total costs of screening, monitoring, and enforcement depend on the size of loan provided to each borrower (= LN/Z, which is proportional to LN since Z is exogenous), the number of clients (= Z/N), and the number of other lender-traders (N), according to:

(6) $$C = c(LN)\,h(N), \qquad with\ c' > 0$$

so

(7) $$NC_{LN} - LC_{LL} = c'N[h + h'N]$$

In the above expression, only h'(N) is ambiguous in sign. It will tend to be positive if there are search externalities among lenders, so that the more lenders there are looking for the good borrowers, the harder it is for any lender to find a good borrower. A model with this property is one where there is duplicative search; and in the working paper version of this paper, we construct a model where the initial efforts of lenders withdraw from the pool of available borrowers the most creditworthy, so that $h' > 0$. Moreover, as N increases, borrowers may perceive that, should they default and be refused further loans from their current lender, it will be easier to find an alternative source of funds; with reduced incentives for repayment, the collection problem with respect to each borrower becomes more difficult (Bolnick, 1992, p. 61). On these accounts, the marginal costs of screening, monitoring, and enforcement will tend to rise as N rises: $h' > 0$. But factors having the opposite effect are that enforcement costs of lending an extra dollar are lower if the lender has fewer clients (fewer farms to visit). If borrowers are sorted among lenders on the basis of, e.g., location, kinship ties, or caste, then a reduction in the number of clients for each lender-trader also entails reduced "transportation costs" per borrower. If the latter effects are not too large, namely, if

$\frac{d\ln h}{d\ln N} > -1$, then (7) will be positive. We characterize the expression $NC_{LN} - LC_{LL}$ as the *crowding effect* of new entry on the marginal cost of lending.

C. The supply of credit to small landowners

Each large landowner is endowed with liquid capital K, time, and land. His output depends on his land, labor, and on-farm investment, but since we will hold his land and on-farm labor constant throughout, we can write his production function as F(R), with $F' > 0$ and $F'' < 0$. If he is a lender-trader, he allocates his liquid capital between on-farm investment and lending. Each lender-trader seeks to maximize his end-of-period income less effort, $F + iL - rG - C$:

$$(8) \qquad \underset{L}{Max} \{ F(K + G - \delta - L) + i(LN)L - rG - C(L, N) \}$$

where i and r are the gross charges of borrowing. (That is, a large landowner who borrows G repays rG and, analogously, a small landowner who borrows z repays iz.) Throughout the analysis, we assume that formal credit G is rationed, and that r is set low enough that it pays all large landowners to borrow G. K + G are the total funds available to the large landowner, and δ + L is the amount spent on the lending activity, leaving K + G - δ - L to be invested in farming.

In choosing the amount to lend, the lender-trader compares the return he obtains on his farm with the return he obtains from lending, taking into account (a) the effect that lending more has on his non-pecuniary screening, monitoring, and enforcement costs, and (b) the fact that to lend more he must reduce the interest rate charged. His lending activity L is implicitly defined by the standard condition equating marginal costs and benefits:

$$F' + C_L = i[1 - \eta] \tag{9}$$

The second-order condition requires

$$\Delta \equiv F'' - C_{LL} + 2i'N + i''LN^2 < 0. \tag{10}$$

It remains to discuss entry into the lending-trading activity. We assume that individuals with funds can enter freely. Abstracting from problems of discreteness, this implies that the returns to being a large landowner-lender-trader equal the returns to remaining a pure farmer:

$$V(N,G) \equiv \max_{L} \{ F(K + G - \delta - L) - C(L,N) + i(LN)L - rG \} = F(K + G) - rG \tag{11}$$

Let $\nu \equiv C_N N/C$, the elasticity of C with respect to N. Let $\alpha \equiv iL/C$, the ratio of revenues from lending to screening/monitoring/enforcement costs. A stability argument yields the result (using

(4)) that

$$\frac{\partial V}{\partial \ln N} = -C[\nu + \alpha\eta] < 0 \tag{12}$$

For if not, then as N increased, the return to being a lender-trader would increase, and the equilibrium would be unstable.

We now have the elements needed to analyze the effect of an increase in formal credit, G, on the interest rate lender-traders charge. Totally differentiating the equilibrium condition in (2), Zz(i) = NL, we have

$$Zz'(i)\ \frac{di}{dG} = L\ \frac{dN}{dG} + N\ \frac{dL}{dG} \tag{13}$$

We will show that an increase in G always leads to an increase in the number of lender-traders: $\frac{dN}{dG} > 0$. For fixed L, this effect tends to lower the informal interest rate (i), as one would expect. But it is possible that an increase in formal credit leads each lender-trader to lend *less*, so much less that the interest rate actually increases and the total amount lent, NL, falls. The reason for this perverse result is that new entry may raise each lender-trader's marginal cost of screening, monitoring, and enforcement, and surely raises his average fixed costs per borrower, $\delta N/Z$. These effects may more than offset the reduction in his opportunity cost of funds, and the resulting contraction in L may more than offset the expansion in N. Before turning to the formal exercise, we provide a diagrammatic exposition.

II. The Expansion of Formal Credit: Diagrammatic Approach

For any given number of lender-traders, each faces a downward sloping demand curve for loans.

The fixed costs of being a trader, the increasing opportunity costs of capital diverted from his own farm, and the increasing marginal cost function $C_L(L,N)$ imply that his average cost curve is U-shaped.

Equilibrium is depicted in Figure 3 as the tangency between the average cost curve and the demand curve (a standard Chamberlinian equilibrium). An expansion of formal credit to large landowners reduces the cost of lending (since with more funds and diminishing returns to capital invested on the land, the opportunity cost of capital declines), so the average cost curve shifts down from AC_0 to AC_1 in Figure 4. At the initial number of lender-traders, lending now yields strictly positive profits, and so more large landowners become lender-traders. With a smaller customer base facing each one, each lender-trader's demand curve shifts to the left. At the same time, the new entry may shift the average cost curve again. Surprisingly, our qualitative results do not depend on the direction of this shift. The figure illustrates the case where the new entry shifts the average cost curve up to AC_2, as the smaller number of borrowers for each lender-trader means that, at any given L, loan sizes are larger; with more lent to each borrower and a larger number of lender-traders, average screening, monitoring, and enforcement costs may increase.

As these shifts occur, eventually a zero-profit equilibrium is attained. It will normally entail each lender-trader lending less, but whether the interest rate is lower or higher--i.e., whether small landowners get more or less funds--is ambiguous. An equilibrium is characterized by two conditions:

$$AC = i \tag{14}$$

and

$$\frac{dAC}{dL} = \frac{di}{dL}, \tag{15}$$

which together imply that at the equilibrium, the elasticity of the average cost curve equals the elasticity of the inverse demand function:

$$\frac{d \ln AC}{d \ln L} \tag{16}$$

Since, at a given interest rate, the elasticity of demand is unchanged by changes in G or N (a consequence of assumptions (A-1) and (A-2)), the RHS of (16) is unchanged by the expansion of formal credit and what is at issue is only the effect on the elasticity of the average cost curve.

Now consider whether the initial interest rate could still be an equilibrium. We will show that it cannot be unless the increases in G and N leave the elasticity of the average cost curve unchanged at that interest rate, as depicted in Figure 5. In this case, the lender-trader chooses to lend L_2 and i_0 is still the equilibrium interest rate. If the increases in G and N *raise* the elasticity of the average cost curve at i_0, so that the average cost curve becomes flatter as in Figure 6A, then the equilibrium i cannot be unchanged. Suppose it were. Then the lender-trader would be at point β in Figure 6A. The demand curve lies above the average cost curve for interest rates above i_0, *and so the lender-trader has an incentive to raise his interest rate*. As he does so, he obtains positive profits and there is further entry. Equilibrium, illustrated in Figure 6B, is finally attained at $i_3 > i_0$.

If the initial increases in G and N *lower* the elasticity of the average cost curve at the initial i, then the same argument shows that the equilibrium interest rate *falls*.

To focus solely on the novel elements introduced into the lender's average cost function in this model--his overhead cost, δ, and screening, monitoring, and enforcement costs, C--let us abstract for the moment from the financial cost of lending by setting $F'(R) \equiv 1$, which means that the time value of money is zero. Then the average costs of lending are just

$$1 + \frac{\delta + C}{L} \equiv NAC,$$

where NAC denotes the average costs of lending net of the cost of capital. The elasticity of the NAC

with respect to L would be unchanged by new entry if screening, monitoring, and enforcement costs were fixed exogenously. With endogenous screening, monitoring, and enforcement costs, the elasticity may either fall or rise with new entry, and hence the interest rate may either fall or rise.[12]

III. The Expansion of Formal Credit: Formal Analysis

A. Entry

We now show formally that an increase in G, the amount made available through the rural credit program, induces entry into the moneylending-trading activity. Applying the envelope theorem to the free entry condition in (11) yields

$$\frac{dV}{dK} = F'(K + G - \delta - L) > F'(K + G). \tag{17}$$

The marginal product of capital is greater for a lender-trader than for a large landowner specialized in farming. Thus, a marginal increase in credit availability induces new entry into the lending-trading activity. The magnitude of the new entry is obtained by totally differentiating (11) and using (12):

[12]We wish to ascertain what happens to the elasticity of the NAC,

$$\frac{d\ln NAC}{d\ln L} = \frac{LC_L}{\delta + C} - 1,$$

as N increases, when we reduce L proportionately as N increases so as to keep the interest rate, i, unchanged along the demand curve. Differentiating, we have

$$\frac{d\left[\frac{d\ln NAC}{d\ln L}\right]}{d\ln N}\Bigg|_{LN=constant} = \frac{L[NC_{LN} - LC_{LL} - C_L]}{\delta + C} - \frac{LC_L[NC_N - LC_L]}{[\delta + C]^2}$$

which is more likely to be positive if the *crowding effect*, $NC_{LN} - LC_{LL}$, is large.

$$(18) \qquad \frac{d\ln N}{dG} = \frac{F'(R_2) - F'(R_1)}{C[\nu + \alpha\eta]} \approx -F''(R_2)\frac{\delta + L}{C[\nu + \alpha\eta]} > 0,$$

where R_1 is on-farm investment by the pure farmer, R_2 is on-farm investment by the lender-trader, and the approximation is a Taylor series. New entry is greater (a) the more rapidly marginal returns to capital invested on the land diminish (the greater is -F″); (b) the smaller the increase (if any) in total screening, monitoring, and enforcement costs as a result of new entry (the smaller is ν); and (c) the greater the elasticity of demand for credit (the smaller is η), which ensures that an increase in the supply of credit can occur without much diminution in the profitability of lending.

B. The Volume of Informal Lending

Totally differentiating the lender's first-order condition in (9), we have

$$(19) \qquad \frac{dL}{dG} = \frac{-F'' + \left[-C_{LN} + 2i'L + i''L^2N\right]\frac{dN}{dG}}{-\Delta}$$

The *cost of capital effect* (-F″) is positive, but since $C_{LN} > 0$ and $i' < 0$, it is apparent that the volume of loans made by a single lender-trader could fall as a result of the new entry induced by the expansion of formal lending.

To see whether *total* lending will fall (and so informal sector interest rates rise), we substitute (18) and (19) into (13), and multiply through by -Δ, to obtain

$$(20) \qquad sign\ \frac{d(NL)}{dG} = sign\ [-F'']\left\{1 - \frac{\delta + L}{C[\nu + \alpha\eta]}\left[F''L + NC_{LN} - LC_{LL}\right]\right\}$$

Note that the stability condition (12) ensures that $\nu + \alpha\eta > 0$. The cost of capital effect, -F″, enters twice into (20): first through the direct effect of the expansion of G on the lender's opportunity cost

of lending and second, indirectly, through the reduction in each lender-trader's lending activity as new entry occurs. Both effects tend to make d(NL)/dG positive. But the *crowding effect*, $NC_{LN} - LC_{LL}$, tends to make d(NL)/dG negative. Recalling footnote 12, the *crowding effect* raises the elasticity of the lender-trader's average cost function with respect to L and thereby flattens the average cost curve, as illustrated in Figure 6A. Hence we obtain formally the result that we illustrated heuristically above: *If the crowding effect is sufficiently large relative to the cost of capital effect, an expansion of formal credit will contract informal lending (raising informal interest rates).*

For the special case of the cost function in (6), C = c(LN)h(N), we can write the elasticities of C with respect to loan size, LN/Z, and the number of moneylenders, N, by

$$\hat{c} \equiv \frac{c'LN}{c}, \quad \hat{h} \equiv \frac{h'N}{h} \tag{21}$$

so that

$$\nu = \hat{c} + \hat{h}, \tag{22}$$

and we have, using the fact that $-F'' > 0$ and rearranging (20) using (6) and (7),

$$\frac{d(NL)}{dG} \begin{matrix} < \\ = \\ > \end{matrix} 0 \quad as \quad c'Nh\frac{\delta}{\delta+L} + h'N\left[c'N - \frac{c}{\delta+L}\right] \begin{matrix} > \\ = \\ < \end{matrix} \frac{L}{\delta+L}i\eta - F''L \tag{23}$$

or, in elasticity form,

$$\frac{d(NL)}{dG} \begin{matrix} < \\ = \\ > \end{matrix} 0 \quad as \quad \hat{c}[\hat{h} + \gamma] \begin{matrix} > \\ = \\ < \end{matrix} [1 - \gamma]\hat{h} + \frac{L}{C}\left[[1 - \gamma]i\eta - LF''\right] \tag{24}$$

where $\gamma \equiv \frac{\delta}{\delta+L}$. The perverse result that informal lending falls (raising the interest rate) as formal

lending expands is more likely to occur (a) the larger is $\hat{c}$, the elasticity of screening/monitoring/enforcement costs with respect to loan size, LN/Z; (b) the larger are average fixed costs, δ/L, which is reflected in a higher value of γ in (24); (c) the more easily large farms can absorb the additional capital (i.e., the smaller is - $F''(R_2)$); and (d) the larger, nonetheless, is the induced entry into the trading and lending activity because the elasticity of each borrower's demand for credit is large (η is small). The role of $\hat{h}$ is ambiguous: high $\hat{h}$ means less entry, but high $\hat{h}$ also means that entry raises the marginal costs of lending by a large amount. So long as $\hat{c}+\gamma > 1$, the net effect of high $\hat{h}$ is to make the perverse result more likely.

C. Discussion

The model has made a number of simplifying assumptions, of which we will discuss four.

1. ***Financial opportunities of lender-traders.*** Our central result that an expansion of institutional credit need not lower the interest rates charged by lender-traders is robust under some alternative specifications of the financial opportunities of lender-traders. Suppose that, in addition to lending and farming activities, a lender-trader can invest in outside production activities or outside financial assets. If these outside opportunities have strictly decreasing returns to scale, then our qualitative results are unaffected. If these outside opportunities (such as bank accounts) have constant marginal returns, then the effect is the same as if we took F' to be a constant so that $F'' = 0$. Substituting $F'' = 0$ into (20), we then have $d(NL)/dG = 0$: all formal sector lending to lender-traders is reinvested in the constant marginal returns financial asset, and none trickles down to the small farmer.

2. ***Lending between large landowners.*** Next, consider the possibility of lending by large

landowners who are not traders to those who are, so that capital flows from left to right in Figure 2. (This relaxes assumption (A.1) above.) Such lending would economize on warehouses and would permit a lender-trader to intermediate funds between many large landowners and many small landowners. But large landowners who lend to traders also need to enforce those loans, and so it is plausible that they will require collateral. Now, collateral can be pledged only once. Assuming that there is a limit on the amount of collateral that a lender-trader has, once that limit is reached, any increase in bank lending to large landowners (and thus any increase in the amount of their land that is mortgaged to the banks), will crowd out intra-sectoral lending on a one-for-one basis. This strengthens our results. An increment in G will be offset by a reduction in lending from pure farmers to lender-traders, and the reduction in the lending opportunities of large landowners who are pure farmers will, in turn, induce more large landowners to become lender-traders. Induced entry will be *larger* in this case than occurred in the absence of assumption (A.1) of no intra-large farm sector lending.

What drives the result that an increase in bank lending induces entry into trading and moneylending is thus *not* the restrictive assumption of no lending by large landowners to lender-traders (nor, as discussed above, the absence of investment opportunities other than farming, informal lending, and trading), but only the assumption that, at the margin, lender-traders have lending or investment opportunities that dominate those of non-lender-traders. This assumption implies that the marginal utility of money to a lender-trader exceeds the marginal utility of money to a non-lender-trader. Hence, after government expands formal credit to large landowners, the utility of lender-traders exceeds that of non-lender-traders so that (from (18)), new entry into the lending-trading activity occurs.

3. *Market size.* Our model assumed that the number of small landowners, Z, that had access to informal credit was independent of G. We could alternatively, and perhaps more reasonably, assume that Z represents the *potential* market size. In a symmetric equilibrium, the actual number of

small landowners to whom each lender-trader lends would then be some number $Z^*/N \leq Z/N$. Presumably at low levels of G, Z^* increases with an increase in G as lender-traders find new clients; at high levels, $Z^* = Z$ and so the analysis is as described above. It is thus possible that as formal credit expands, the total number of individuals with access to informal credit goes up. A failure of informal sector interest rates to fall may then reflect the greater costs and risks associated with providing credit to the new, marginal borrowers. In that case, the volume of informal sector lending and the average informal interest rate could move together, and changes in the average informal sector interest rate would fail to be a good measure of the success of government credit interventions. However, we are not aware of evidence that the clientele of informal lenders has expanded as formal credit has increased.[13]

4. ***Market structure.*** There is one effect that this paper has not modeled that we think is of potential importance. We assumed that lender-traders competed for the business of small landowners only through entry. But an increased number of lender-traders would tend to induce price competition. In work in progress, we model this case. We observe in the more general model a richer set of comparative statics. The expansion of formal credit may, as here, induce new entry; however, if the competitive effect is large enough, it may actually decrease the profitability of moneylending and so induce exit. If there is exit, then informal interest rates must fall. If there is new entry, we confirm, as in the model of this paper without price competition, that the effect on informal sector lending of an expansion in formal credit is ambiguous.

IV. Changes in Technology

There is a longstanding debate as to whether the expansion of the financial sector must

[13]For a discussion of the evidence from Thailand, Pakistan, and the Philippines, respectively, see Siamwalla et al., 1990, pp. 289-90; Aleem, pp. 335-336; and Yotopoulos and Floro, p. 165.

precede economic growth or, alternatively, "financial development reflect[s] economic growth whose mainsprings must be sought elsewhere" (Goldsmith, 1969, p. 48).[14] Our model illuminates this debate. We will argue in this section that technological change affects not only the demand for credit, but also the transaction costs of "producing" loans, and that a consideration of only the demand side can lead to pessimistic and misleading conclusions. We consider the demand side first.

A. An increase in credit demand

Technological change that increases the productivity of capital tends to shift up the small landowners' demand curve for loans and also to increase large landowners' shadow price of diverting capital from their own land. But let's take the case where these demand side effects are *most* favorable to the small landowner, i.e., the case where the direct effect of the technological change is only to increase the small landowners' demand for loans. An example of such a technological change is the motorized plow, which in some areas of Asia dominates oxen-drawn plows used by small farmers, but is inferior to tractors used by large farmers. The direct effect is depicted in Figure 7A as a vertical shift by a factor λ in the demand curve for loans.

At the initial number of lender-traders, lending now yields strictly positive profits, and so more large landowners become lender-traders. New entry has two effects. First, with a smaller customer base facing each one, the demand curve shifts left. Second, with higher N and thus for any given L, larger loan sizes (LN/Z), the marginal cost of lending an additional unit may increase through the *crowding effect*, and so the elasticity of the average cost curve may increase. Recalling Section II, this effect is reflected in the flattening of the average cost curve. This effect can be so

[14]There is no doubt that the two are positively correlated. See, in addition to Goldsmith, Townsend's (1983) cross-section and time-series plots of the ratio of private credit to Gross Domestic Product, and Ghatak's (1983, pp. 31-32) finding that at the district level in India, average informal sector interest rates are negatively correlated with the average value of yields per hectare.

large that the new equilibrium entails an increase in the interest rate that is even larger than the vertical shift in the demand curve: *in this case, with increased demand for credit, there is decreased supply*. This case is depicted in Figure 7B, where $i_1 > [1+\lambda]i_0$. This result is possible because the magnitude of the shift, λ, depends only on the extent to which technological change induces substitution of capital for other factors of production. The shift in the average cost curve has to do with an entirely different set of factors--namely, the magnitude of entry and the effect of entry on the elasticity of the lender-trader's average cost curve. The increase in interest rates will hurt the small farmer but will not help the lender-traders, whose utility (from the free entry condition in (11)) remains unchanged at $F(K + G) - rG$.

More generally, as the *crowding effect*, NC_{LN}-LC_{LL}, becomes large, a larger share of the rents from any improvement in the technology used by small landowners will be dissipated. But (recalling (20)), the larger the crowding effect, the smaller is d(NL)/dG. Thus, *the more important credit market imperfections are as a barrier to small landowners' adoption of new technology, the less effective an expansion of formal credit will be in removing that barrier.*

B. A reduction in the cost of screening, monitoring, and enforcement leading to an increase in credit supply

The above looked at only the demand side. But technological change, by increasing the productivity of farming, also changes the costs of screening, monitoring, and enforcement. Let ζ parameterize the level of infrastructure and technology, with $C = C(L,N,\zeta)$ and $C_\zeta < 0$. An increase in ζ reduces the amount of information that a lender requires about a farmer's abilities, land quality, access to water, and so on, and/or decreases the likelihood that a lender will have to return to

a farmer's fields on numerous occasions to obtain repayment of a given amount.[15] ζ would go up with public investment in irrigation and drainage systems and expenditures on pest control (which reduce risks from adverse agroclimatic conditions and increase the farmer's permanent income), with an improvement in farmers' access to markets or to technical consulting services, and with the spread of cash crops of high and stable value.

Suppose that at an initial level of ζ, a lender-trader is lending L* and is spending $C(L^*,N,\zeta)$ on screening, monitoring, and enforcement. Then, with an increase in ζ, the borrower's permanent income goes up, and the lender wishes to increase L. From the lender-trader's first-order condition in (9), an increase in desired L for given N implies $C_{L\zeta}(L^*,\zeta,N) < 0$.

Totally differentiating the equilibrium condition in (2), $Zz(i) = LN$, we have

$$Zz'(i)\,\frac{di}{d\zeta} = N\,\frac{dL}{d\zeta} + L\,\frac{dN}{d\zeta} \tag{25}$$

Obtaining $dN/d\zeta$ and $dL/d\zeta$ by differentiating (11) and (9), and substituting these results into (25), yields

[15]Whether or not a particular technological change reduces screening, monitoring, and enforcement costs is a subtle question. For instance, with high-yielding varieties (HYV) of seed, using the appropriate farm management practices becomes more critical for obtaining successful results, and thus the introduction of HYV seeds might require lenders to screen prospective borrowers more intensively. But low-ability farmers may rationally choose not to adopt HYV seeds. And eventually, the technological change and resulting rise in incomes increases occupational differentiation in the rural sector, with low-ability farmers leasing out their land and taking jobs in nearby towns. Lanjouw and Stern (1993) provide evidence of the latter phenomenon in Palanpur, India, after the Green Revolution. In this case, the type of seed used might be a costless screening device.

$$\text{(26)} \qquad sign\ \frac{d(NL)}{d\zeta} = sign\left\{-C_{L\zeta} + \frac{C_\zeta}{C[\nu + \alpha\eta]}\cdot\left[F''L + NC_{LN} - LC_{LL}\right]\right\}$$

The first term is the direct effect (through the first-order condition) of the reduction in marginal screening/monitoring/enforcement costs. The second term is the effect of entry. It is easy to see that a sufficiently large value of $C_{L\zeta}/C_\zeta$ (the ratio of the change in marginal lending costs over the change in average lending costs) ensures that $d(NL)/d\zeta > 0$. Through its effects on the *transactions* costs of lending, rather than on the *capital* costs, an improvement in the real economy (its transport links, extension services, water drainage, pest control, etc) can expand informal lending (lowering interest rates).

One may well ask whether technology change can do this even under circumstances when the expansion of formal credit could not? Or does the ineffectiveness of credit policy *imply* the ineffectiveness of technological change in expanding informal credit? It does not, provided that

$$\text{(27)} \qquad \frac{C_{L\zeta}}{C_\zeta} > \frac{1}{\delta + L}$$

(using (20) and (26)). This condition is easily interpreted. The ratios on each side of the inequality are the change in marginal lending costs over the change in average lending costs induced by the instruments, ζ and G, respectively. Now, it is reasonable to assume that any improvement in technology that increases the small landowner's permanent income has a larger effect on the lender-trader's screening, monitoring, and enforcement costs of lending the *last* dollar (when the lender may be pushing against the borrower's repayment ability), than on those costs of lending the average

dollar, so that the LHS of (27) *exceeds* one. Provided that each lender-trader has total capital costs ($= \delta + L$) in excess of his marginal capital costs of lending one dollar ($= \$1$), the RHS is *less than* one. These two conditions ensure that (27) holds.

Evidence for the supply effect of technological change would be that technological changes were in fact followed by a reduction in informal sector interest rates. Such a finding would moreover indicate that the supply side effect was large--large enough to offset the demand side effect that normally entails both a shift up in the demand curve and an increase in the lender's opportunity cost of diverting funds from his own farm. The most direct evidence of such an effect is reported by Iqbal (1988, esp. pp. 373-74). He finds in a panel survey of approximately 3,000 farm households throughout India that rural informal interest rates are inversely related to prior community-level investments in infrastructure and extension in the borrower's village; in more developed areas, interest rates are lower and borrowings higher than in less developed areas. Interestingly, informal interest rates are also inversely related with the education of the farmer-borrower.

Feder's (1993) analysis of his data from rural Thailand is also suggestive of the role of technological change in relaxing credit constraints. He finds in a cross-section study of titled and untitled farmers in four Thai provinces that possession of a land title, which is strongly positively related to the level of borrowing from government-subsidized formal lenders, does not affect farm productivity and agricultural investments on land in the most developed province (Lop-Buri), where farmers produce cash crops of high value under low-risk agroclimatic conditions, but does affect farm productivity and investment in less developed areas (see his Table 13-2). In Lop-Buri Province, but not in the less developed areas, the level of trader-provided credit is high and farmers apparently do not face credit market constraints.

V. The *Modus Operandi* of the Lender-trader

This section sets forth apparent regularities in the *modus operandi* of lender-traders that

motivated the formal model of this paper.

1. A trader who lends money to a client generally requires him to sell all his crops to, or through the trader.[16] This trade-credit linkage

> makes information on the size of the borrower's operations (and their changes) available to the creditor and to no one else. Trade-credit linkage thus closes the borrower's access to other [informal] lenders (Siamwalla et al., p. 282).

Nagarajan (p. 100) found in her survey in the rice-growing region of the Philippines, that in 84 percent of the loans extended by trader-lenders, the borrower was required to repay in paddy, usually valued at market rates.

2. Principal and interest are recovered at harvest time from the value of crops sold, and these loans are not secured by land collateral. Lender-traders who make seasonal loans can assure repayment by being present at the debtor's farm at harvest time. For example, in Aurepalle, India,

> The large moneylenders have regular employees who visit clients to learn the harvest date. The moneylender will then go to the threshing floor himself or send his employee with a bullock out to recover the principal and interest at the threshing floor. (Walker and Ryan, 1990, p. 203)

It is consistent with lender-traders' reliance on collecting principal and interest at the harvest that Siamwalla et al. (p. 282) report that traders do not provide credit to producers of cassava. Unlike other crops, cassava can be harvested at any time over a period of nearly a year, so that it would be difficult for lender-traders to find out the harvest date in advance.

In some towns with well-organized commodity markets, traders cooperate in enforcement. Bell reports that

[16]This requirement is noted in studies of India, Thailand, Pakistan, and the Philippines, respectively, by Bell, p. 306; Siamwalla et al., 1990, pp. 279, 282; Aleem, p. 348; and Floro and Yotopoulos, p. 78. Of the borrowers in the Thai household survey summarized above in Table 1, line 6, five-sixths reported that they borrowed from only one informal source (p. 279).

> In Chittoor [India], for example, a commission agent who dealt in *gur* [a sugar product] told me that agents frequently know one another's clients. If a farmer attempted to sell through an agent other than the one with whom he normally dealt, the former would deduct principal and interest on the loan, basing his calculations on the usual rule-of-thumb relating the size of the loan to the quantity to be delivered, and hand over the said sum to the latter. Others doing field research in India have reported similar practices elsewhere in India (p. 313).

It is in the interest of each lender-trader to perform that service for others, so that they do it for him. For immobile populations of farmers, under this system it would be difficult for a farmer to find an outlet for his crops without also repaying his debt.

3. Lender-traders lend primarily out of their own savings and out of government-subsidized funds; they do not take deposits in substantial amounts from savers. In his detailed study of the operations of 14 informal lenders serving a rural area in Sind, Pakistan, Aleem (1990) found that

> on average approximately half of the funds used by the informal lender come from his own savings, 30 percent from institutional sources either directly or indirectly (from cotton mills, wholesalers, and so forth who have direct access to such funds), and the remainder from other informal lenders as well as from clients who use him as a safe deposit (at zero cost) for surplus cash. (p. 341)[17]

In response to a specific question in Aleem's survey, lenders reported a marginal cost of funds from 20 to 50 percent (Aleem, Table 6, col. 1). These figures reflect, in most cases, the cost of getting marginal funds from other informal lenders, and they are much higher than the prevailing bank rate of 10 percent for borrowers and the even lower rate paid on savings accounts in banks.

4. Screening new applicants for credit and chasing overdue loans entails substantial time and effort by lender-traders. The most precise measurements are again reported in Aleem's (1990) study. He found that on average the screening process undertaken by informal lenders took one year (two agricultural seasons) during which the potential borrower, by engaging in a variety of commercial

[17]A similar, though very incomplete, picture emerges from household surveys in Thailand (Onchan, 1992, p. 106; Siamwalla et al., 1990, p. 289), and India (Bell, 1990, pp. 309-11). For a general discussion of the financial operations of moneylenders, see Bhaduri (1987).

transactions with the lender, demonstrated his "likely marketable surplus and the way he conducts business" (p. 333). On average, informal lenders then rejected more than 50 percent of the applicants screened (pp. 335-36). For loans that were overdue, informal lenders spent on average almost three days chasing each one down (Aleem, Table 3). The opportunity costs of the lenders' time, their costs of travel and personnel, and a pro-rated portion of their rent of shop and warehouse[18], were 39 rupees per 100 rupees lent (Table 5). This was a *greater* cost than the sum of their cost of funds lent, delinquency costs, and bad debt (27 rupees per 100 rupees lent). One measure of the success of these lenders' screening and enforcement efforts is the very low incidence of debt on which principal had not been repaid, reported in Aleem, Table 3, as less than 3 percent of all loans since the lenders' inception of lending operations. Farmers who could not repay in one year because of a bad crop or other misfortune repaid the principal later in a year of a good crop.

5. *A borrower's relation with a single informal lender typically extends over many years.* Siamwalla et al. (1990, p. 279) reported that more than 72 percent of informal sector borrowers in a 14-village survey of Thailand had not attempted to borrow from other informal lenders during the past three years, and that of these 72 percent, the average period of contact involving credit transactions was almost seven years. In the Philippines, a regular borrower from a particular lender is called a *suki*. Nagarajan (1992, Table 13) found that 58 percent of all loans from lender-traders went to households with which the lender-trader had had a *suki* relationship for more than five years.[19]

[18]Each lender's warehouse costs were allocated between lending and trading according to the proportion of the lender's working time spent on the lending activity.

[19]Long-term relationships not only create an information base, but also mitigate moral hazard. If the failure to get timely repayment in one year reduces access to capital in later years, then the borrower has greater incentives to repay. This in turn implies that the borrower obtains more

An implication of the mode of operation of lender-traders described above is that for those not rejected as borrowers, the screening process creates relationship-specific capital. Having successfully passed the lender-trader's screening test, the household becomes eligible for both production and consumption credit at short notice. Although most villages surveyed in the studies cited above are served by several informal lenders, and capital requirements to entry into moneylending are relatively low, the relationship-specific capital built up through a long-term relationship between a household and lender-trader makes any other lender-trader an imperfect substitute for the one on which the household currently relies.[20] This provides a way to interpret the fact that lender-traders borrow from other lender-traders to lend to their own clients, and Siamwalla et al.'s observation for Thailand that "when a region suffers a collective shock [so that local moneylenders' have no equity to lend]..., the consumption loan market ceases to function" (1990, p. 291). Informational capital has been (at least temporarily) lost, and it cannot be quickly replaced.

Finally, a direct test of the market structure in which lender-traders compete is found in Aleem's study of the operations of 14 lenders serving a rural money market in Sind, Pakistan. His first finding was that mean marginal costs of lending as a fraction of the amount recovered were much less than the average interest rate reported by borrowers. His second finding was that total costs of lenders, as a fraction of the amount recovered, were comparable to the total interest payments

favorable borrowing terms in a longer-term relationship; see Stiglitz and Weiss (1983).

[20]While the fact that a particular individual is lending money to a particular borrower is likely to be public knowledge (and thus *some* of the information which the lender has gleaned is made public), the amount lent, the interest rate charged, and the efforts required to enforce collection are not likely to be public. An essential task of the lender in screening loan applicants is determining the amount to be lent; not only does an increase in loan size increase the probability that the borrower will not be able to repay the promised amount, it also increases enforcement problems, as noted in Section I.B.

received. These findings suggest that the informal commercial lending market is characterized by monopolistic competition.[21] Each informal lender faces a downward-sloping demand curve from borrowers tied to him through their historical relationships, so that he can price at above marginal cost, but entry of new informal lenders keeps pure profits close to zero by driving the price down to the average cost.[22]

VI. Conclusion

In this paper, we have tried to construct a model that captured important aspects of rural credit markets in which traders are the principal lenders. The basic message of the model was that expanding formal credit to the rural sector, intermediated through large rural landowners, may be

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[21]The evidence of competition driving profits down is especially strong in light of the fact that the above figures do not reflect a risk premium. For even if there is no wilful default, informal lenders face the risk of a natural or market disaster that sweeps under all local farmers.

[22]An objection that can be raised against this argument is that, since in some areas, as discussed above, lender-traders are able to collude to enforce contracts, why don't they also collude to fix prices? Lender-traders will not be able to fix prices as long as there are any individuals in or near the village with sufficient funds to become lenders, as one association of rice traders in south India discovered when it decided to act collusively (Harriss, 1983, p. 236). An attempt to fix prices induces entry, and an attempt to create an entry barrier by threatening nonenforcement of debts owed to new entrants would not be in the self-interest of the incumbents. If that threat were carried out, the new entrants would only more surely undermine the position of the incumbents by giving the incumbents' debtors a marketing outlet for their crops by which they could avoid repayment. Thus it is a Nash equilibrium for each lender-trader to enforce the debt of *every* other lender-trader, even that owed to new entrants. This game could be modelled either as a supergame or as a finite game under the kinds of imperfect information considered in Kreps, Milgrom, Roberts, and Wilson (1982).

ineffective in helping the small landowner, since a part of the implied subsidy is dissipated through excessive entry of moneylender-traders, and of the rest that is not dissipated, it is possible that relatively little or even none reaches the small farmers.

How then can a fragmented credit market be moved toward a more efficient equilibrium? Our model has a marginal screening/monitoring/enforcement cost function serving as an important ingredient of the determination of informal interest rates. Improvements in infrastructure and technology that lower these costs result in a reduction of the interest rates moneylenders charge. This is consistent with the negative correlation in some studies between informal interest rates and prior community-level investments in infrastructure and extension. In the paper we have developed a framework in which fragmented credit markets with very high informal sector interest rates are a consequence, rather than a cause, of low levels of economic development.

Our paper thus suggests a way to cut the Gordian knot of current thinking about development efforts. On the one hand, it is sometimes argued that development efforts, such as improvements in irrigation, will yield low benefits since farmers will have insufficient capital (access to credit) to take full advantage of these improvements. But small farmers are unable to accumulate capital absent significant improvements in their productivity. Our analysis suggests that, under plausible conditions, the new demand for credit (associated with the increased returns to capital) arising from such technological improvements may create its own supply.

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Table 1. Share of Trader-Provided Loans in Total Value of Loans, Various Surveys

Survey coverage	Share of trader-provided loans in total value of informal loans (%)	Share of informal loans in the total value of loans (formal + informal) (%)
The Philippines		
1. Cultivating households, Nueva Ecija, 1988-90 (127 households)	58	89
Cultivating households, Cagayan, Nueva Ecija, and Iliolo, 1983-84		
2. Developed areas (62 households)	60	90
3. Marginal areas (49 households)	38	94
India		
4. Cultivating households, Punjab, 1980-81 (40 households)	62[a]	46
5. Cultivating households, Andra Pradesh, 1980-81 (40 households)	17	65
Thailand		
6. Rural households, Nakhon Ratchasima province, 1984-85 (1,500 households)	32	56

[a]Includes only loans that were interlinked with trade in output, which may understate total lending by trader-lenders.

Sources (by line)

1. Nagarajan (1992, Tables 9, 11, 12, and 15)
2.,3. Floro and Yotopoulos (1991, Fig. 3.2, Table 5.1, and p. 123)
4.,5. Bell (1990, Table 6)
6. Siamwalla et al. (1990, Table 4 and p. 277)

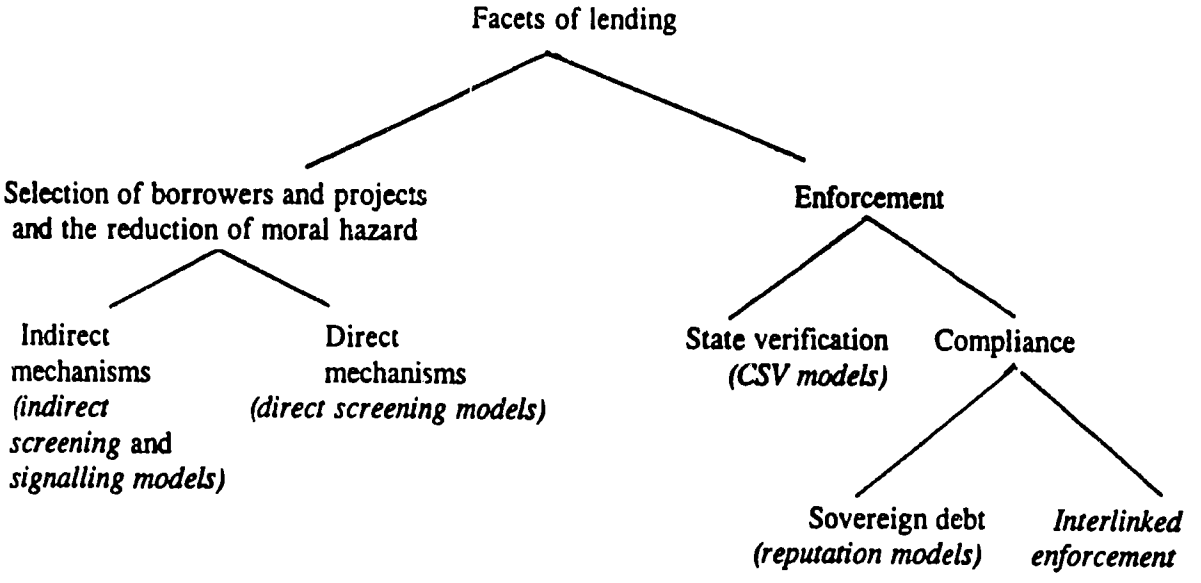

Figure 1. Taxonomy of lending models

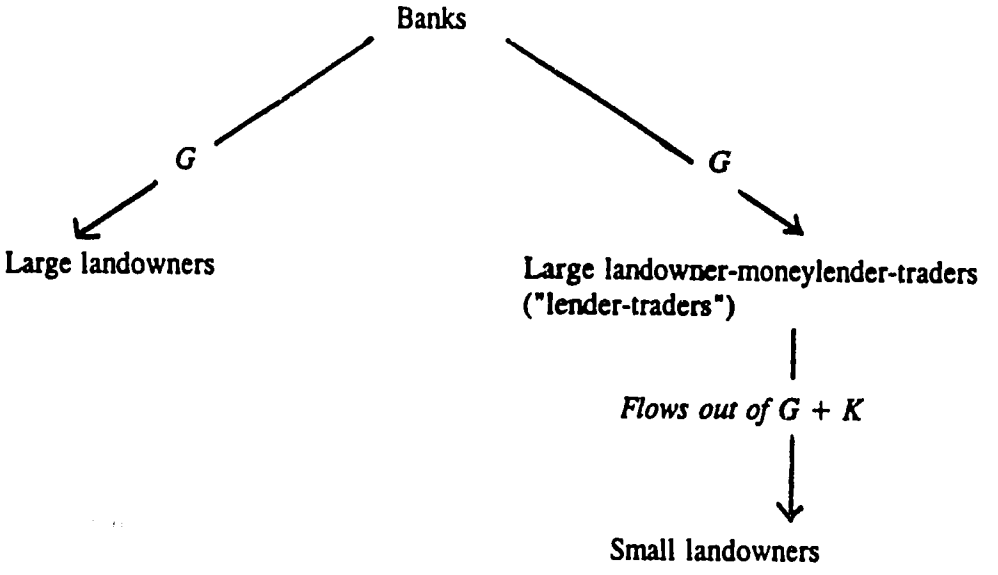

Figure 2. Schema of a formal and informal credit market

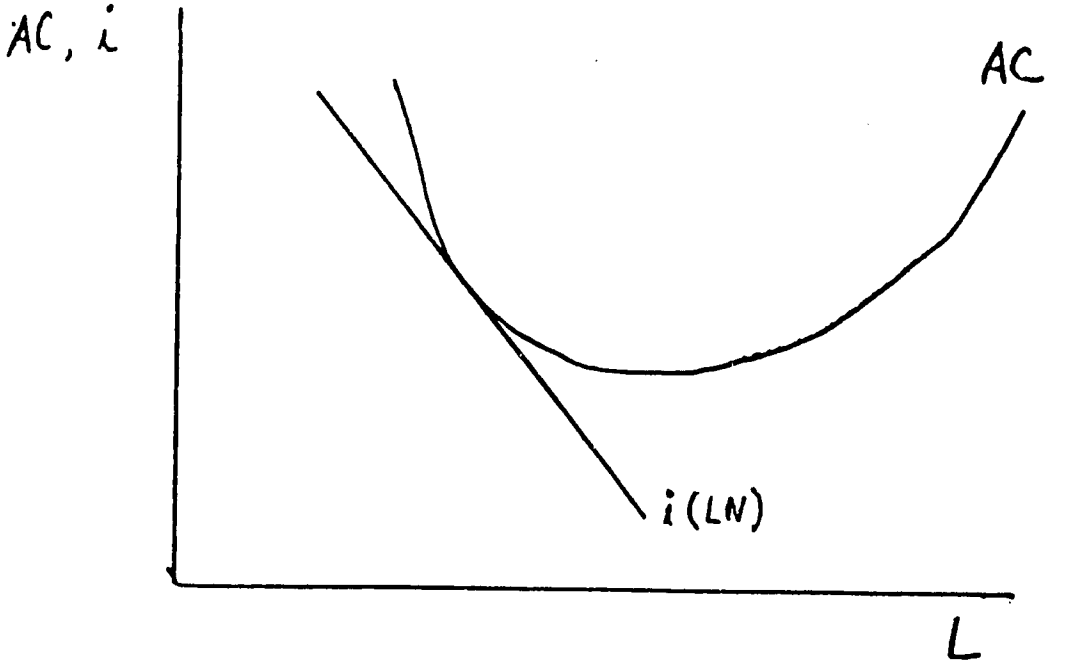

Figure 3. Informal credit market equilibrium

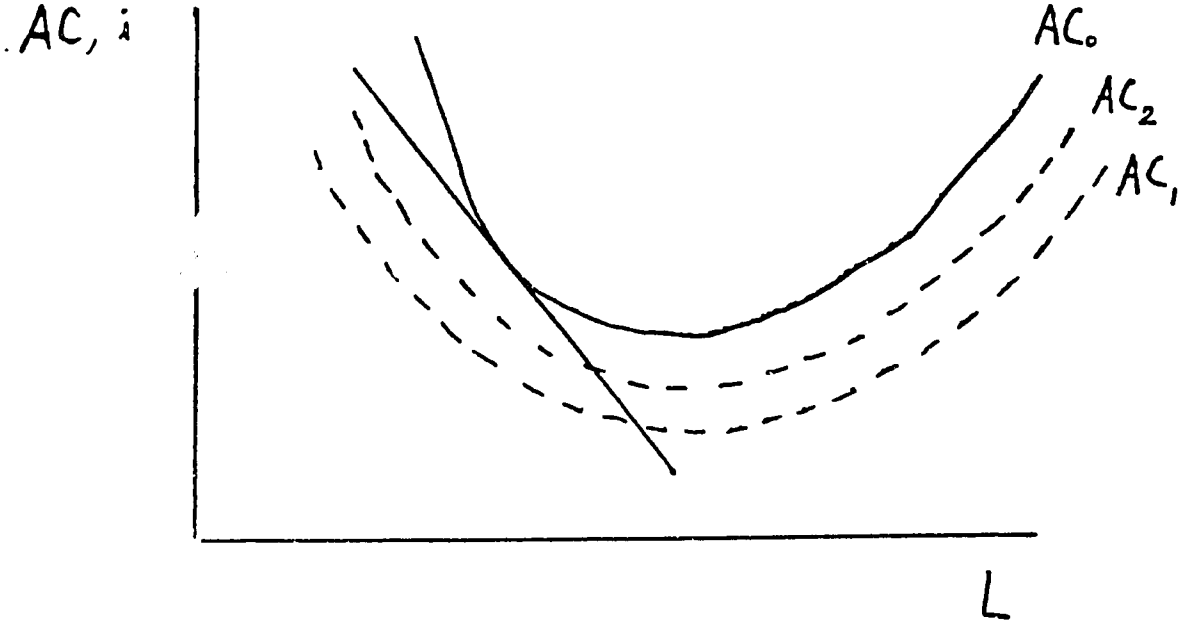

Figure 4. Direct and indirect cost effects of the expansion of formal credit

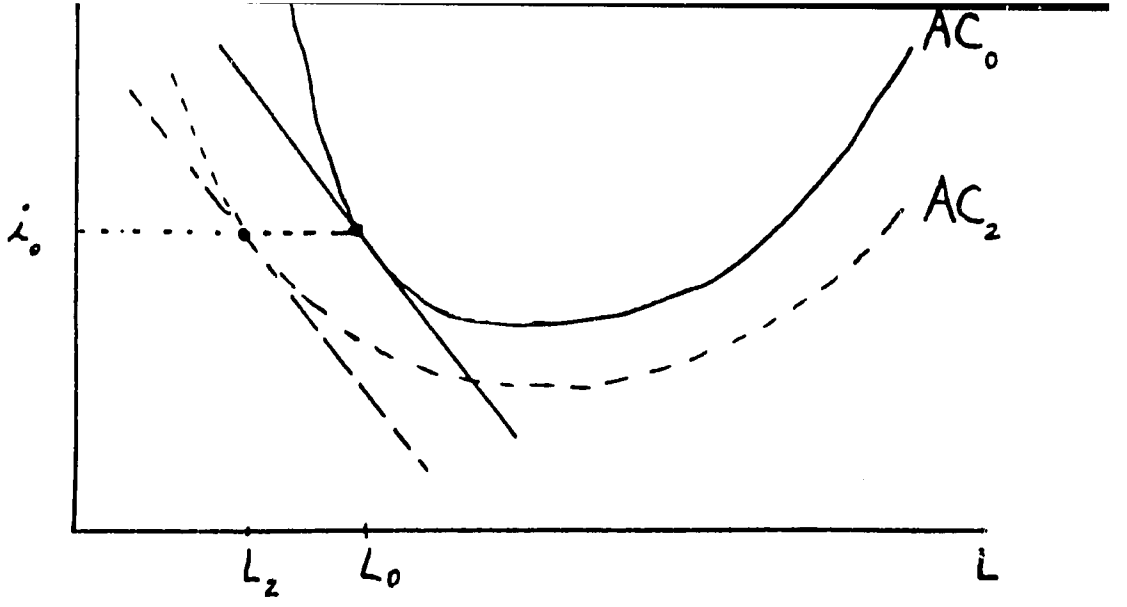

Figure 5. Constant elasticity of the AC curve at the initial i

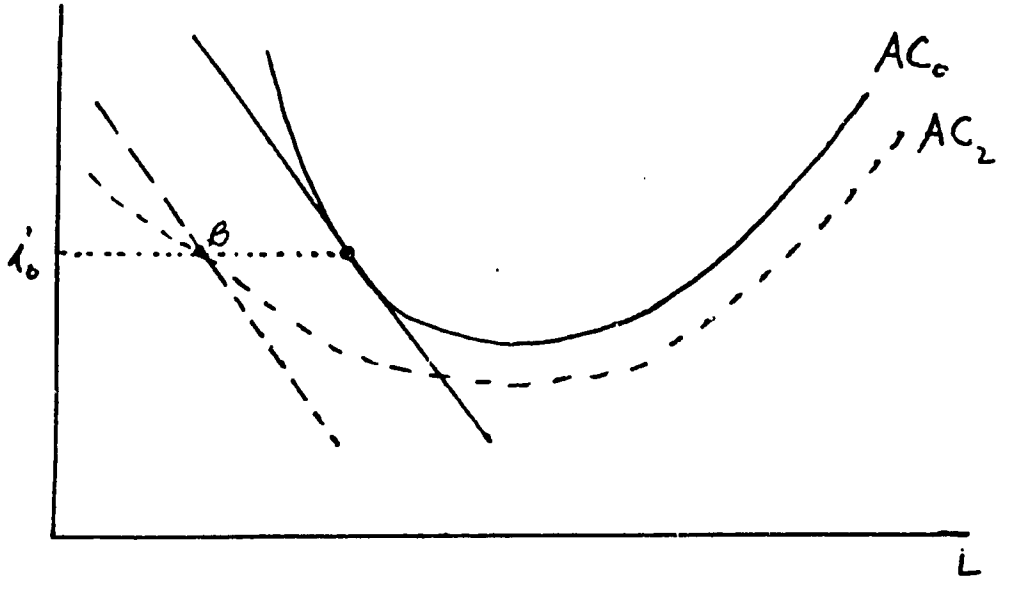

Figure 6A. A fall in the elasticity of the AC curve at the initial i

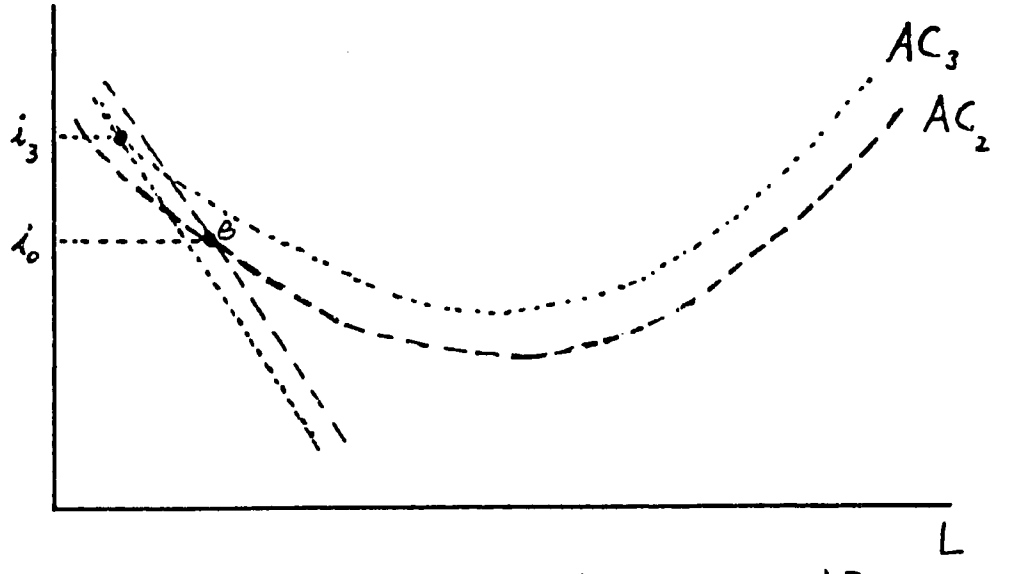

Figure 6B. New equilibrium at a higher i

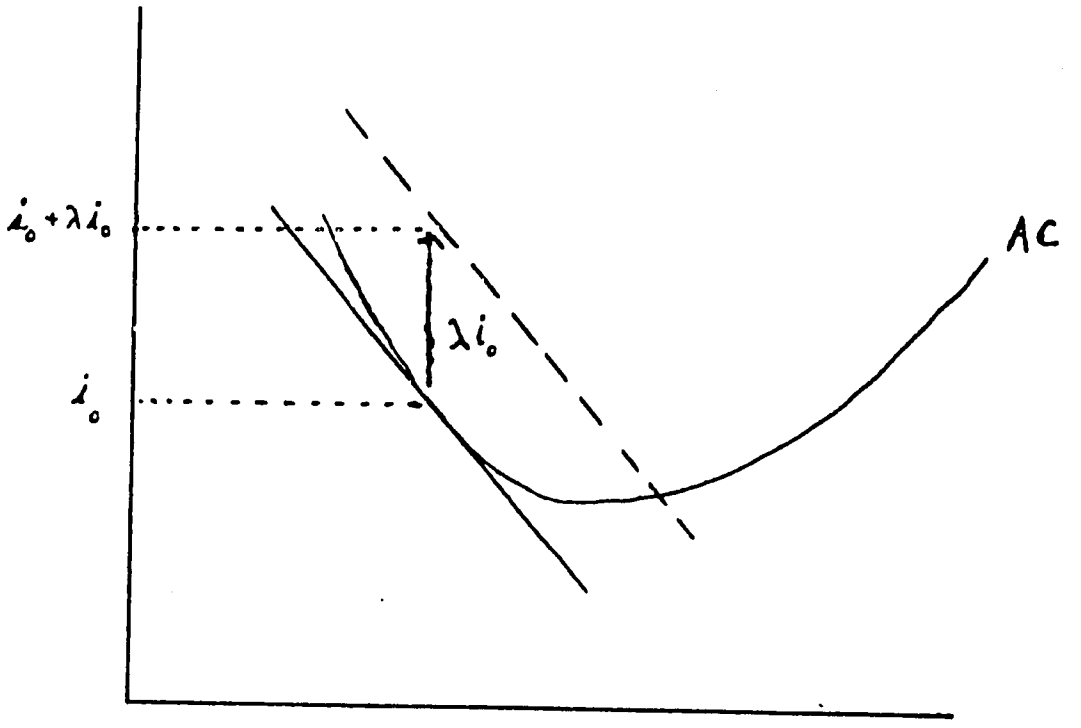

Figure 7A. Vertical shift in the demand curve

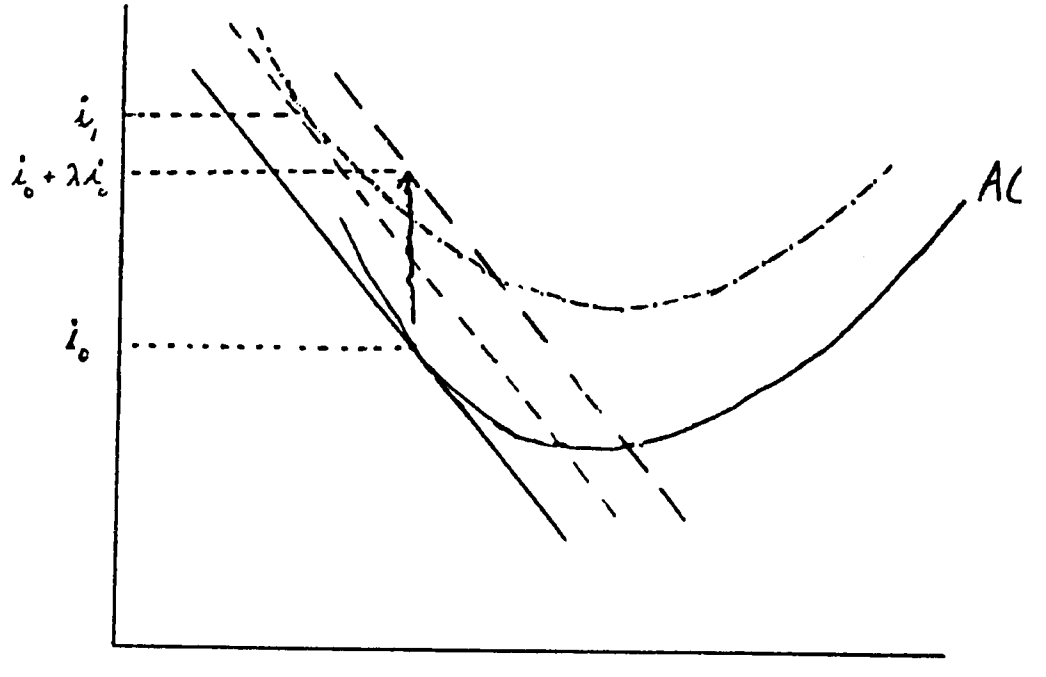

Figure 7B. The increased demand yields a lower aggregate supply.